

Topic in Dentistry

Lift the Lips: Dentigerous Cysts in Dogs & Alveolar Bone Expansion in Cats

Part 1: Dentigerous Cysts



Image 1: Photograph of the right rostral mandible. Note the missing right mandibular first premolar tooth (405).

A complete awake examination includes evaluation of the oral cavity and any missing teeth should be noted. This is particularly important for the mandibular first premolar tooth as its absence may cause significant pathology. Our first case is that of a 6-year old male neutered boxer dog that was missing the right mandibular first premolar tooth (Image 1). Intraoral radiographs were obtained (Image 2) and the patient was referred for treatment of a large-cyst like structure in the right mandible.

There is a well-defined lucency with clear borders in the right rostral mandible extending from the mesiolingual aspect of 404 (right mandibular canine tooth) to the level of the distal root of 407 (right mandibular third premolar). Rostrally the expansile lesion extends to the apices of 401, 402 and 403 (right mandibular first, second and third incisors).

Dorsally the cyst extends to the alveolar ridge and ventrally to the ventral cortex. There is an unerupted 405 (right mandibular first premolar) with the crown directed rostrally and the apex directed caudally. There are irregular root margins with absent periodontal ligament space consistent with external inflammatory root resorption associated with the

roots of 404, 405, 406 and 407. The following tooth roots are all either completely or partially superimposed over the cyst: 402, 403, 404, 405, 406, and 407.

The most likely diagnosis given the radiographic appearance of the lesion in combination with the presence of the unerupted tooth is a dentigerous cyst. Although the radiographic appearance is nearly pathognomonic, differential diagnoses include a canine odontogenic parakeratinized cyst, radicular cyst, or benign odontogenic tumor. Definitive diagnosis is dependent upon histopathology.

For any tooth that is completely within bone, there is risk of development of a dentigerous cyst. A dentigerous cyst is a benign odontogenic lesion characterized by an expansile, fluid-filled cavity that is lined by epithelium and contains an unerupted tooth crown.

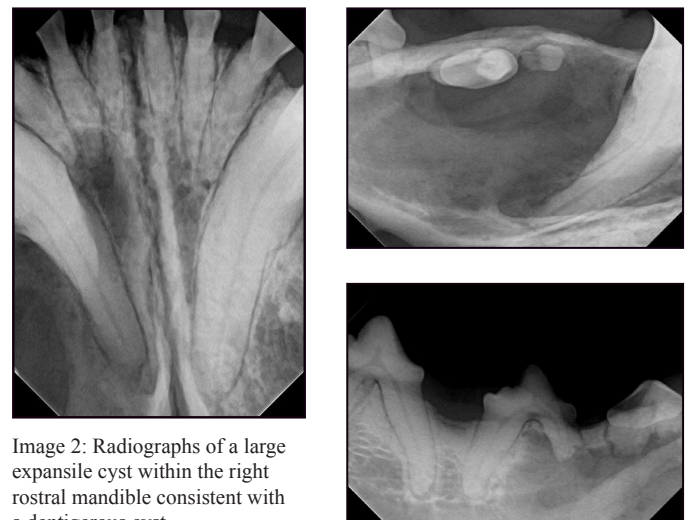


Image 2: Radiographs of a large expansile cyst within the right rostral mandible consistent with a dentigerous cyst.

To understand dentigerous cyst formation, it is necessary to briefly describe the histology of tissues overlying the tooth before it begins to erupt. Prior to erup-

tion, the crown of the tooth is covered by a double layer of epithelial cells. The inner layer in contact with the enamel are the ameloblasts which are the cells that previously secreted the enamel proteins which mineralized to form the enamel. As they have performed their function at this point in tooth development, they adhere to the enamel surface and are no longer able to divide. The outer layer are the remnants of all the remaining layers of the dental organ, which was one of the formative elements of the tooth that was responsible for determining the shape of the crown and forming the enamel, amongst other functions. This outer layer retains its ability divide. Together, these two layers of epithelial cells are called the reduced enamel epithelium.

Between the reduced enamel epithelium and the overlying oral epithelium is a layer of connective tissue, which breaks down as the tooth erupts. As the tooth erupts, the oral epithelial cells migrate over the reduced enamel epithelium and the epithelial cells of the outer layer of the reduced enamel epithelium divide and eventually become the junctional epithelium. The junctional epithelium forms the sulcus of the tooth and is attached to the cemento-enamel junction. Once the dentoalveolar junction has been completely formed, the remaining dental epithelium is lost.

If the tooth fails to erupt, then the reduced enamel epithelium remains around the crown of the tooth.



Image 4: Radiograph of an unerupted right mandibular first premolar tooth (405) in a 12-year old dog. There is no evidence of cyst formation.

In cases of dentigerous cyst formation, hydrostatic forces cause the reduced enamel epithelium to separate from the crown of the tooth. As the reduced enamel epithelium is around the crown of the tooth and is attached to the cemento-enamel junction, this results in an expansile cyst that can become quite large as fluid continues to accumulate.

Over time, a dentigerous cyst can expand to destroy surrounding bone (Image 3) and neighboring teeth. Inflammation results in proliferation of the epithelial cells and cholesterol granulomas are often seen. In some cases, the oral mucosa may be inflamed resulting in pericoronitis, which can be painful. There is also concern for the potential (albeit rare) for malignant transformation. Although not every unerupted tooth goes on to develop a dentigerous cyst (Image 4), radiographs of any missing tooth (commonly the mandibular first premolars in brachycephalic breeds) are recommended to determine if the tooth is unerupted. Proactive extraction of any unerupted tooth is recommended to avoid the formation of a dentigerous cyst. Care must be taken during extraction not to damage the roots of the surrounding teeth, particularly the mandibular canine tooth.

Treatment of dentigerous cysts involves extraction of the unerupted tooth and any neighboring tooth that is displaced or has tooth resorption (in this case 402, 403, 404, 405, 406, and 407), and enucleation of the entire cyst wall. Incomplete excision may lead to recurrence of the cyst. Submission of the lining for histopathology is recommended to confirm the diagnosis and to ensure there has not been malignant transformation of the epithelial cyst lining (in rare instances carcinomas have

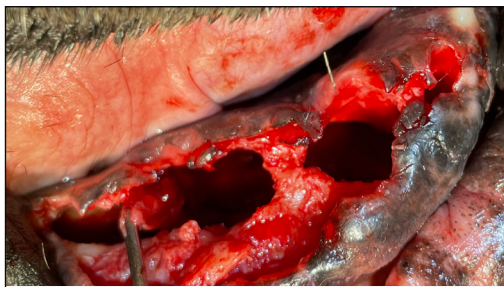


Image 3: Photographs of the large void in the alveolar bone of the right mandible created by the expansile cyst before and after removal of the cyst lining.



Image 5: Photograph of the extracted right mandibular canine tooth (404). There is marked loss of root structure secondary to external inflammatory root resorption. This correlates with the irregular root margins and loss of periodontal ligament space seen radiographically.

been found in the cyst lining). Tooth 401 was clinically evaluated intraoperatively to determine if the cyst had resulted in inflammatory root resorption or if there was alveolar bone loss around the apex where the blood supply enters the tooth. As there was complete alveolar bone coverage around the tooth, extraction of this tooth was not indicated.

Extraction of the right mandibular canine tooth (404) was necessary (Image 5). Prognosis of this tooth was poor both due to the extent of inflammatory root resorption and likely loss of apical blood supply. Also, clinically, removal of the entire cyst lining proved to be impossible without extraction of this tooth. In some cases, where there is exposure of a portion of the canine tooth root without clinical or radiographic evidence of inflammatory root resorption, the periodontal ligament space can reform once the alveolar bone fills in the void created by the

enucleated cyst (Image 6). In such cases, especially when the cyst does not involve the apex of the tooth and there is no clinical or radiographic evidence of external inflammatory root resorption, the decision may be made to leave the canine tooth and follow-up with radiographs in 6 months to ensure that the periodontal ligament space has re-formed.



Image 6: Radiographs of a dentigerous cyst before treatment and 6 months after treatment. Note the intact periodontal ligament space on the distal aspect of the left mandibular canine tooth (304) after treatment.

About the Author



Marika Constantaras, DVM, DAVDC
AIS Staff Dental Specialist

Dr. Marika Constantaras grew up in Germany, Maryland, and Japan before attending the University of Illinois where she earned her undergraduate and concurrent DVM and MS degrees. After five years of general practice in Chicago, she completed a three-year residency in dentistry and oral surgery and became a diplomate of the American Veterinary Dental College.

Hawaii is now home and she enjoys working in both clinical practice as well as assisting with radiograph interpretation and subsequent case management through AIS. Core to her investment in the growing field of veterinary dentistry is educating veterinarians on the recognition and treatment of dental disease, whether through formal lectures, wet labs, in-hospital training, or remote consultations.

Part 2: Alveolar Bone Expansion

Alveolar bone expansion or chronic alveolar osteomyelitis of the maxillary canine teeth in cats can be identified on awake examination (Image 1) and is characterized by a uniform, smooth expansion of the alveolar bone on the labial aspects of these teeth.

Moderate to severe buccal bone expansion has been shown to be associated with periodontitis and/or tooth resorption and treatment of these teeth is necessary. Both maxillary canine teeth in this cat are also affected by inflammatory root resorption (Image 2), which occurs secondary to periodontal disease, endodontic disease, osteomyelitis or neoplasia. Careful evaluation of the palatal aspect of the affected teeth using a fine periodontal probe is necessary to identify any areas of vertical bone loss as radiographs are unreliable for identification of bone loss on the palatal aspects of the maxillary canine teeth.

In this patient, given the presence of periodontal disease, as well as the bilateral nature of the pathology, neoplasia is considered much less likely and the bone expansion most likely secondary to chronic alveolar osteomyelitis.

Samples of the alveolar bone on the labial aspects of the maxillary canine teeth may be submitted for histopathology for definitive diagnosis. For typical cases of alveolar bone expansion with a similar radiographic appearance, especially when the



Image 1: Photograph of a cat with severe alveolar bone expansion associated with both maxillary canine teeth. Note the extrusion of both teeth.

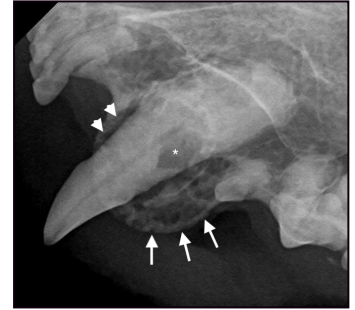


Image 2: Radiograph of the left maxillary canine tooth (204). Note the marked expansion of buccal alveolar bone (arrows), vertical bone loss (arrow heads) and inflammatory root resorption (asterisk).

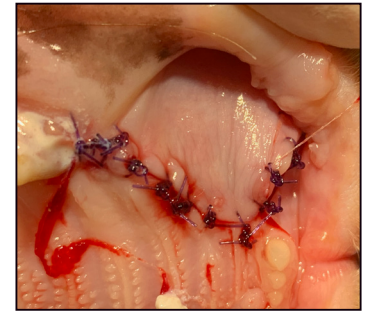
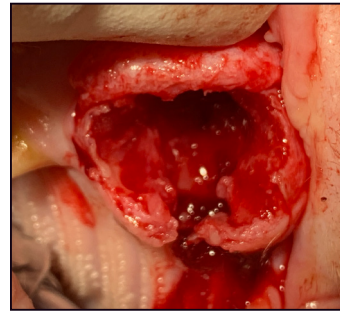
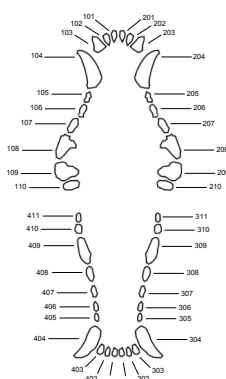


Image 3: Photographs of the alveolar bone expansion prior to alveoplasty and following closure of the oral surgery site.

pathology is bilateral, treatment of the diseased teeth should not be delayed pending histopathology as the likelihood of neoplasia is low. A conservative option would be to biopsy and plan for treatment of dental disease following confirmation of osteomyelitis.

Need help with a dentistry case?

Submit a dentistry consult request to receive a **tooth-by-tooth** report with treatment recommendations!



For more information,
contact Technical Support at:
1-877-727-6800

Support@antechimagingsservices.com

To learn more about our services, please
visit www.antechimagingsservices.com

